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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,934	08/20/2003	Woo-Shik Lee	6192.0307.US	5383
7590	10/18/2005		EXAMINER DUONG, THOI V	
McGuire Woods Suite 1800 1750 Tysons Boulevard McLean, VA 22102-4215			ART UNIT	PAPER NUMBER
			2871	

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/643,934

Applicant(s)

LEE ET AL.

Examiner

Thoi V. Duong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-52 ~~is/are~~ pending in the application.
- 4a) Of the above claim(s) 27-52 ~~is/are~~ withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-9, 14-16 and 19-22 ~~is/are~~ rejected.
- 7) ☒ Claim(s) 4, 5, 10-13, 17, 18 and 23-26 ~~is/are~~ objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This office action is in response to the Amendment filed July 19, 2005.

Accordingly, claims 1-26 were amended. Currently, claims 1-52 are pending in this application, of which claims 27-52 are withdrawn and claims 1-26 are considered in this office action.

Response to Arguments

2. Applicant's arguments with respect to claims 1 and 14 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1 and 14 are indefinite for failing to point out what "compression ratios of the spacers" recited in the claims are. A clear meaning of "compression ratios of the spacers" is essential to the practice of the claimed invention.

Claims 2-13 and 15-26 are also rejected since they are dependent on the indefinite claims.

In the following rejections, the Examiner will interpret "the compression ratio of the spacer" as compressive modulus E which is inversely proportional to the diameter of the spacer as well-known in the art.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 3 and 6-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Hatano et al. (Hatano, USPN 6,331,881 B1).

Re claim 1, as shown in Figs. 1(A) and 1(B), Hatano discloses a liquid crystal display (LCD) device, comprising:

a substrate 1A having a display region (A1-A4); and

a plurality of spacers 3b formed in the display region,

wherein compression ratios of the spacers 3b gradually increase as advancing from a center to an edge (left edge) of the display region since the diameter of the spacer 3b in region A1 is smaller than that in region A2 (col. 9, lines 47-51).

Re claim 3, the LCD device further comprises a black matrix 4 and a common electrode 2b, wherein the spacers are formed over the black matrix 4.

Re claim 6, the spacers are tapered, side surfaces of the spacers 3b form a constant tapered angle with respect to the substrate 1a (col. 9, lines 52-61), and diameters of the spacers 3b in regions A1 and A2 decrease as advancing from the center to the edge (left edge) of the display region as shown in Figs. 1(A) and 1(B).

Re claims 7 and 8, it is inherent that a polymer linking density of the spacers and Young's modulus of the spacers decrease as advancing from the center to the left edge

of the display region due to reduction of cross-section areas of the spacers 3b in regions A1 and A2 as shown in Fig. 1(b).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 14, 16 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al. (Nishiyama, USPN 6,507,385 B1) in view of Hatano et al. (Hatano, USPN 6,331,881 B1).

Re claim 14, as shown in Fig. 1, Nishiyama discloses a liquid crystal display (LCD) comprising:

- a first substrate 2 including a display region for displaying an image;
- a second substrate 1 facing the first substrate 2;
- a fence 7 disposed between the first substrate and the second substrate, the fence surrounding the display region to form a space defined by the first and second substrates and the fence;
- a liquid crystal layer 4 disposed in the space; and
- a plurality of spacers 3 disposed in the space and maintaining the distance between the first and second substrates.

Nishiyama discloses an LCD that is basically the same as that recited in

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claim 14 except for compression ratios of the spacers gradually increasing as advancing from a center of the display region to an edge of the display region.

As shown in Figs. 1(A) and 1(B), Hatano discloses a liquid crystal display (LCD) comprising a plurality of spacers 3b formed in a display region (A1-A4), wherein compression ratios of the spacers 3b gradually increase as advancing from a center to an edge (left edge) of the display region since the diameter of the spacer 3b in region A1 is smaller than that in region A2 (col. 9, lines 47-51).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the LCD of Nishiyama with the teaching of Hatano by having compression ratios of the spacers gradually increasing as advancing from a center of the display region to an edge of the display region so as to obtain a high self-holding property to suppress change in display state which may be caused by an externally applied pressure (col. 11, lines 1-5).

Re claim 16, the LCD device of Hatano further comprises a black matrix 4 and a common electrode 2b, wherein the spacers are formed over the black matrix 4.

Re claim 19, the spacers are tapered, side surfaces of the spacers 3b form a constant tapered angle with respect to the substrate 1a (col. 9, lines 52-61), and diameters of the spacers 3b in regions A1 and A2 decrease as advancing from the center to the edge (left edge) of the display region as shown in Figs. 1(A) and 1(B) of Hatano.

Re claims 20 and 21, it is obvious that a polymer linking density of the spacers and Young's modulus of the spacers decrease as advancing from the center to the left

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edge of the display region due to reduction of cross-section areas of the spacers 3b in regions A1 and A2 as shown in Fig. 1(b) of Hatano.

9. Claims 2 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano et al. (Hatano, USPN 6,331,881 B1) in view of Kajita et al. (Kajita, USPN 6,275,280 B1).

Hatano discloses a liquid crystal display device that is basically the same as that recited in claims 2 and 9 except for the spacers being spaced apart from the pixel electrodes and the spacer at the center having a compression amount smaller than that of the spacer disposed at the edge by about 0.1 micrometer.

As shown in Fig. 1 and 6-8, Kajita discloses a liquid crystal display device comprising a plurality of pixel electrodes 10 formed on a substrate 13, wherein spacers 24 are formed such that the spacers deviate from the pixel electrodes 10.

As shown in Fig. 2, Kajita discloses that the load compression displacement of the spacers is preferably from 0.01 to 0.1 micrometer/mN (col. 4, lines 10-25) so that the display quality is not reduced when subjected to a force or impact from outside (col. 2, lines 10-16).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the liquid crystal display device of Hatano with the teaching of Kajita to have an amount of compression of the spacer disposed at the center being smaller than an amount of compression of the spacer disposed at the edge by about 0.1 micrometer so as to maintain a uniform gap (col. 2, lines 10-16).

10. Claims 15 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al. (Nishiyama, USPN 6,507,385 B1) in view of Hatano et al. (Hatano, USPN 6,331,881 B1) as applied to claims 14, 16 and 19-21 above and further in view of Kajita et al. (Kajita, USPN 6,275,280 B1).

Nishiyama in view of Hatano discloses a liquid crystal display device that is basically the same as that recited in claims 15 and 22 except for the spacers being spaced apart from the pixel electrodes and the spacer at the center having a compression amount smaller than that of the spacer disposed at the edge by about 0.1 micrometer.

As shown in Fig. 1 and 6-8, Kajita discloses a liquid crystal display device comprising a plurality of pixel electrodes 10 formed on a substrate 13, wherein spacers 24 are formed such that the spacers deviate from the pixel electrodes 10.

As shown in Fig. 2, Kajita discloses that the load compression displacement of the spacers is preferably from 0.01 to 0.1 micrometer/mN (col. 4, lines 10-25) so that the display quality is not reduced when subjected to a force or impact from outside (col. 2, lines 10-16).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the liquid crystal display device of Nishiyama with the teaching of Kajita to have an amount of compression of the spacer disposed at the center being smaller than an amount of compression of the spacer disposed at the edge by about 0.1 micrometer so as to maintain a uniform gap (col. 2, lines 10-16).

Allowable Subject Matter

11. Claims 1 and 14 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

12. Claims 4, 5, 10-13, 17, 18 and 23-26 are objected to as being dependent upon the rejected base claims 1 and 14, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and/or if claims 1 and 14 are rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

The following is an examiner's statement of reasons for allowance: none of the prior art of record fairly suggests or shows all of the limitations as claimed. Specifically,

Re claims 4, 11, 17 and 24, none of the prior art of record discloses, in combination with other limitations as claimed, the spacers being tapered such that tapered angles of side surfaces of the spacers with respect to the substrate gradually increase as advancing from the center to the edge of the display region.

The most relevant reference, USPN 6,507,385 B1 to Hatano et al. (Hatano), fails to disclose the claimed invention. Hatano only discloses the spacers 3b being tapered with respect to the substrate 1a as shown in Fig. 1(A).

Re claims 10 and 23, none of the prior art of record discloses, in combination with other limitations as claimed, the spacers being formed, such that a condition $1 < A_{\text{center}} / A_{\text{edge}} < 1 + 0.1A_{\text{center}}$ is satisfied, where A_{center} is a cross-sectional area of the spacer disposed at the center and A_{edge} is a cross-sectional area of the spacer disposed at the edge.

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The most relevant reference, USPN 6,507,385 B1 to Hatano et al. (Hatano), fails to disclose the above condition. As shown in Figs. 1(A) and 1(B), Hatano only discloses that a cross-sectional area of the spacer 3b disposed at the center (Acenter) is larger than a cross-sectional area of the spacer 3b disposed at the left edge (Aedge).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

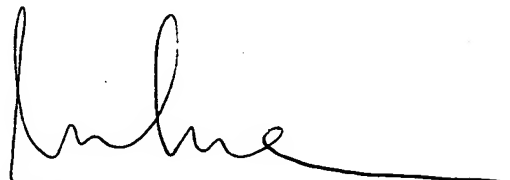
13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim, can be reached at (571) 272-2293.

Thoi Duong



10/17/2005



DUNG T. NGUYEN
PRIMARY EXAMINER